

will be welcomed by plant pathologists, especially those who are interested in tropical plant diseases. In the introduction the author states that the losses due to fungi are at least 10 per cent. He also states that "certain articles on phytopathology in the tropics give an entirely wrong impression of the number and destructiveness of the diseases." In the Malayan regions, at least so far as the Philippines are concerned, there are represented all groups of fungi that are present in the temperate regions. Extremely destructive diseases are produced by some of each group. It is very evident from this and other works that the diseases follow the host plants very closely. Agricultural plants, especially vegetables and truck crops that are very widely distributed, are attacked by the same pathogens, whether grown in the tropical or temperate zones. The coffee industry was at one time wiped out by a fungus, the cacao loss is about 50 per cent, and the rice losses are very heavy. The author lists 60 hosts of which about one-half are grown to a greater or less degree within the bounds of the United States, especially in the southern states or Pacific Coast states. There are a total of 339 diseases listed, many of which are found within the United States. The author gives brief but accurate descriptions of the symptoms, the causal organisms, and statements concerning the control measures. Ten pages are devoted to the discussion of spray mixtures and methods of control.—MEL T. COOK.

Root-nodules.—Miss SPRATT⁷ has investigated the formation of root-nodules by *Bacillus radicola*. The plants producing nodules when infected are sharply differentiated into 2 classes, legumes and non-legumes. In the Leguminosae the cortical cells respond to the stimulus, resulting in the nodule. In other plants the penetration of the bacteria into root-hairs and cortex induces no morphological change until a young lateral root is infected during its passage through the cortex, and as a consequence becomes swollen and forms the nodule. In other words, the root-tubercles of non-leguminous plants are modified lateral roots, while those of the legumes are exogenous in origin. A contrast in the structure of the 2 types of nodule is evident. In leguminous nodules the bacteroidal tissue is central, and the vascular system consists of a number of peripheral strands; while in the non-leguminous nodules the stele is central, retaining its connection with the root cylinder and growing point. In making a comparative study of the nodules of Leguminosae, Miss SPRATT recognizes 4 types, based chiefly upon the distribution of meristem, bacteroidal tissue, and vascular tissue, and these types are definite enough to characterize various groups of Leguminosae.

The author concludes that "the form of the nodule depends primarily on the nature of the environment of the host, which influences the cell-sap and consequently the behavior of the bacteria after they have entered, and secondarily on the anatomical peculiarities of the particular plant."—J. M. C.

⁷ SPRATT, ETHEL R., A comparative account of the root-nodules of the Leguminosae. *Ann. Botany* 33:189-199. *pl. 13. figs. 5.* 1919.